CLAIMS

1. **(Previously Presented)** A diffraction element comprising:

a light-transmittable member; and

a diffraction grating which is formed on at least one face of the light-transmittable member;

wherein when a first laser beam having a first wavelength $\lambda1$ and a second laser beam having a second wavelength $\lambda2$ are transmitted through the diffraction element, the diffraction element turns the first and second laser beams into first and second diffracted beams having first and second diffraction efficiencies, respectively;

wherein the diffraction element functions to equalize the first and second diffraction efficiencies by only the one face of the diffraction element; and

wherein the diffraction grating has a first phase modulation amount $\o1$ for the first laser beam and a second phase modulation amount $\o2$ for the second laser beam and the first and second phase modulation amounts $\o1$ and $\o2$ are, respectively, approximately expressed by the following equations (1) and (2):

$\o1=2\pi N1\pm\Delta\o$ ---(1)

$\o2=2\pi N2\pm\Delta\o$ ---(2)

in which "N1" and "N2" are natural numbers and "$\Delta\o$" is a phase variation amount.

2. **(Previously Presented)** The diffraction element as claimed in Claim 1, wherein the diffraction grating has a plurality of land portions each having a width Wa and a plurality of groove portions each having a width Wb alternately arranged therein and has a duty ratio defined as $\{Wa/(Wa+Wb)\}$ so as to assume a value other than 0.5.

3. **(Original)** The diffraction element as claimed in Claim 1, wherein the first laser beam is a blue laser beam having a wavelength of 380 to 420 nm as the first wavelength $\lambda1$ and the second laser beam is a red laser beam having a wavelength of 630 to 680 nm as the second wavelength $\lambda2$.

4. **(Previously Presented)** The diffraction element as claimed in Claim 1, wherein the diffraction grating has a depth h approximately expressed by the following equation (3):

$$h=[N\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\,(n1-1)\}] \text{ ---(3)}$$

in which "N" is a natural number, "n1" is a refractive index of the diffraction element for the first laser beam and "n2" is a refractive index of the diffraction element for the second laser beam; and

wherein a zero-order diffraction efficiency of the first laser beam and a zero-order diffraction efficiency of the second laser beam are approximately equal to each other and a first-order diffraction efficiency of the first laser beam and a first-order diffraction efficiency of the second laser beam are approximately equal to each other.

5. **(Previously Presented)** The diffraction element as claimed in Claim 4, wherein the diffraction grating has a depth h1 expressed by the following equation (4):

$$h1=[\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\,(n1-1)\}] \text{ ---(4)}$$

in which the natural number N is set to 1 in the equation (3).

6. **(Previously Presented)** The diffraction element as claimed in Claim 5, wherein the diffraction grating has a plurality of land portions each having a width Wa and a plurality of groove portions each having a width Wb alternately arranged therein and has a duty ratio defined as {Wa/(Wa+Wb)}; and

wherein when the duty ratio is 0.135, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

7. **(Previously Presented)** The diffraction element as claimed in Claim 4, wherein the diffraction grating has a depth h2 expressed by the following equation (5):

$$h2=[2\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\,(n1-1)\}] \text{ ---(5)}$$

in which the natural number N is set to 2 in the equation (3).

8. **(Previously Presented)** The diffraction element as claimed in Claim 7, wherein the diffraction grating has a plurality of land portions each having a width Wa and a plurality of groove portions

portions each having a width Wb alternately arranged therein and has a duty ratio defined as {Wa/(Wa+Wb)}; and

wherein when the duty ratio is 0.2, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

9. **(Previously Presented)** The diffraction element as claimed in Claim 4, wherein the diffraction grating has a depth h3 expressed by the following equation (6):

$h3=[3\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\ (n1-1)\}]$ ---(6)

in which the natural number N is set to 3 in the equation (3).

10. **(Previously Presented)** The diffraction element as claimed in Claim 9, wherein the diffraction grating has a plurality of land portions each having a width Wa and a plurality of groove portions each having a width Wb alternately arranged therein and has a duty ratio defined as {Wa/(Wa+Wb)}; and

wherein when the duty ratio is 0.5, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

11. **(Original)** The diffraction element as claimed in Claim 1, wherein the diffraction grating is formed by material having polarization anisotropy.

12. **(Original)** The diffraction element as claimed in Claim 1, wherein the diffraction grating is formed by isotropic material having no polarization anisotropy.

Claims 13 and 14 **(Canceled)**

15. **(Previously Presented)** A method comprising designing a diffraction grating formed on only one face of a light-transmittable member in a diffraction element such that a first laser beam having a first wavelength λ1 and a second laser beam having a second wavelength λ2 are transmitted through the diffraction grating at first and second diffraction efficiencies, respectively;

wherein the diffraction grating has a plurality of land portions each having a width Wa and a plurality of groove portions each having a width Wb and a depth h alternately arranged

therein and has a duty ratio defined as {Wa/(Wa+Wb)} such that the first and second diffraction efficiencies are adjusted by using the duty ratio and the depth h of the diffraction grating as parameters;

wherein the depth h of the diffraction grating is approximately expressed by the following equation (7):

$$h=[N\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\ (n1-1)\}] \text{ ---(7)}$$

in which "N" is a natural number, "n1" is a refractive index of the diffraction element for the first laser beam and "n2" is a refractive index of the diffraction element for the second laser beam; and

wherein a zero-order diffraction efficiency of the first laser beam and a zero-order diffraction efficiency of the second laser beam are approximately equal to each other and a first-order diffraction efficiency of the first laser beam and a first-order diffraction efficiency of the second laser beam are approximately equal to each other.

16. **(Previously Presented)** The method as claimed in Claim 15, wherein the diffraction grating has a depth h1 expressed by the following equation (8):

$$h1=[\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\ (n1-1)\}] \text{ ---(8)}$$

in which the natural number N is set to 1 in the equation (7).

17. **(Original)** The method as claimed in Claim 16, wherein when the duty ratio is 0.135, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

18. **(Previously Presented)** The method as claimed in Claim 15, wherein the diffraction grating has a depth h2 expressed by the following equation (9):

$$h2=[2\lambda 1\lambda 2/\{\lambda 1(n2-1)+\lambda 2\ (n1-1)\}] \text{ ---(9)}$$

in which the natural number N is set to 2 in the equation (7).

19. **(Original)** The method as claimed in Claim 18, wherein when the duty ratio is 0.2, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

20. **(Previously Presented)** The method as claimed in Claim 15, wherein the diffraction grating has a depth h3 expressed by the following equation (10):

$$h3=[3\lambda1\lambda2/\{\lambda1(n2-1)+\lambda2\ (n1-1)\}] \text{ ---(10)}$$

in which the natural number N is set to 3 in the equation (7).

21. **(Original)** The method as claimed in Claim 20, wherein when the duty ratio is 0.5, a ratio of the zero-order diffraction efficiency to the first-order diffraction efficiency is approximate to (10/1).

22. **(Previously Presented)** An optical head device comprising:

a first laser beam source for emitting a blue laser beam having a first wavelength $\lambda1$;

a second laser beam source for emitting a red laser beam having a second wavelength $\lambda2$;

an optical lens for condensing the blue laser beam or the red laser beam at a minute spot on an information recording face of an optical information medium;

a photodetector for outputting, in response to the blue laser beam or the red laser beam reflected on the information recording face of the optical information medium, an electric signal corresponding to a quantity of the blue laser beam or the red laser beam; and

a diffraction element including a light-transmittable member and a diffraction grating formed on at least one face of the light-transmittable member;

wherein when the blue laser beam and the red laser beam are transmitted through the diffraction element, the diffraction element turns the blue laser beam and the red laser beam into first and second diffracted beams having first and second diffraction efficiencies, respectively;

wherein the diffraction element functions to equalize the first and second diffraction efficiencies by only the one face of the diffraction element;

wherein the diffraction grating has a first phase modulation amount ø1 for the blue laser beam and a second phase modulation amount ø2 for the red laser beam and the first and second phase modulation amounts ø1 and ø2 are, respectively, approximately expressed by the following equations (11) and (12):

$$ø1=2\pi N1\pm\Delta ø \text{ ---(11)}$$

$$ø2=2\pi N2\pm\Delta ø \text{ ---(12)}$$

in which "N1" and "N2" are natural numbers and "$\Delta\o$" is a phase variation amount; and

wherein the photodetector receives the first or second diffracted beam so as to detect a servo signal.

Claim 23 **(Canceled)**

24. **(Previously Presented)** An optical information apparatus comprising:

an optical head device which includes a first laser beam source for emitting a blue laser beam having a first wavelength $\lambda 1$, a second laser beam source for emitting a red laser beam having a second wavelength $\lambda 2$, an optical lens for condensing the blue laser beam or the red laser beam at a minute spot on an information recording face of an optical information medium, a photodetector for outputting, in response to the blue laser beam or the red laser beam reflected on the information recording face of the optical information medium, an electric signal corresponding to a quantity of the blue laser beam or the red laser beam, and a diffraction element having a light-transmittable member and a diffraction grating formed on at least one face of the light-transmittable member;

wherein when the blue laser beam and the red laser beam are transmitted through the diffraction element, the diffraction element turns the blue laser beam and the red laser beam into first and second diffracted beams having first and second diffraction efficiencies, respectively;

wherein the diffraction element functions to equalize the first and second diffraction efficiencies by only the one face of the diffraction element;

wherein the diffraction grating has a first phase modulation amount $\o 1$ for the blue laser beam and a second phase modulation amount $\o 2$ for the red laser beam and the first and second phase modulation amounts $\o 1$ and $\o 2$ are, respectively, approximately expressed by the following equations (11) and (12):

$\o 1=2\pi N1\pm\Delta\o$ ---(11)

$\o 2=2\pi N2\pm\Delta\o$ ---(12)

in which "N1" and "N2" are natural numbers and "$\Delta\o$" is a phase variation amount;

wherein the photodetector receives the first or second diffracted beam so as to detect a servo signal;

a motor for rotating the optical information medium; and

an electric circuit for controlling and driving, on the basis of a signal received from the optical head device, the motor or one of the optical lens, the first laser beam source and the second laser beam source of the optical head device.

Claim 25 **(Canceled)**

26. **(Original)** A computer comprising:

an optical information apparatus of Claim 24;

an input unit for inputting information;

an arithmetic unit for performing arithmetic operation on the basis of the information inputted by the input unit or information reproduced from the optical information apparatus; and

an output unit for displaying or outputting the information inputted by the input unit, the information reproduced from the optical information apparatus or a result of the arithmetic operation of the arithmetic unit.

Claim 27 **(Canceled)**

28. **(Previously Presented)** An optical information medium player comprising:

an optical information apparatus of Claim 24; and

a decoder for converting an information signal obtained from the optical information apparatus into an image.

Claim 29 **(Canceled)**

30. **(Previously Presented)** A car navigation system comprising:

an optical information apparatus of Claim 24; and

a decoder for converting an information signal obtained from the optical information apparatus into an image.

Claim 31 **(Canceled)**

32. **(Original)** An optical information medium recorder comprising:

an optical information apparatus of Claim 24; and

an encoder for converting image information into information to be recorded on the optical information medium by the optical information apparatus.

Claim 33 **(Canceled)**

34. **(Original)** An optical disc server comprising:

an optical information apparatus of Claim 24; and

an input/output terminal for exchanging information with an external appliance.

Claim 35 **(Canceled)**